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ABSTRACT

In spite of their limitations, readability formulas can help teachers determine whether there are differences between students' reading abilities and the difficulty levels of the textbooks they are required to use. A study was conducted to assess the reading levels of students and the readability levels of textbooks at five selected junior colleges in Alabama during 1987-88. Thirty textbooks from eight content area courses were selected to represent typical textbook readings for core curricula in business, the humanities, natural sciences, and social sciences. The Fry Readability Formula and Graph were used to determine the difficulty levels of the textbooks. The Nelson-Denny Reading Test was used to determine the reading levels of a sample of 377 students. Study findings included the following: (1) the average reading level of the students in the sample was 12.12 grade, with the levels ranging from 3.0 to 16.9; (2) 54.6% of the students read below the college level (13.0); (3) the average readability level of the textbooks was 13.93, with levels ranging from 9 to 17; (4) 70% of the textbooks used were at the college level; and (5) 67% of the students in the sample had reading levels below the average readability level of the textbooks. (EJV)

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Many students in public two-year colleges with open-door admissions policies frequently experience difficulty with their textbook reading assignments, and "teachers are in widespread agreement that low reading ability is a major problem in the community college" (Spring 131). Teachers also know that certain textbooks are more difficult than others, thereby further complicating the tasks of college students. Because readability formulas attempt to quantify the difficulty levels of textbooks, readability studies provide valuable information which enables teachers to see if differences exist between students' reading abilities and the difficulty levels of the textbooks they are required to use.

Readability Studies in Two-Year Colleges

Although the study of readability can be traced to Spencer's 1852 essay, readability studies at the two-year college level were rarely conducted before 1971, when Cline conducted a study at a community college in Missouri to compare the reading ability of students with the readability levels of textbooks used in their classes. Students in Cline's study were administered Form A of the **Nelson-Denny Reading Test** to determine their reading levels, and the Fry (1968) formula was used to determine the readability levels of the textbooks. The average reading grade level for the textbooks was 13.0. Approximately 52% of the students had reading levels lower than the readability levels of the textbooks they were assigned.

Other readability studies (e.g., McClellan and McClellan, Bertalan, Johnson, and Levy and Dixon) reported significant differences between students' reading abilities and the difficulty, or readability, levels of the textbooks the students were required to use in content area classes.

Advantages and Disadvantages of Readability Formulas

Readability formulas are mechanical measures that attempt to yield an approximate level of difficulty for reading material. In general, readability formulas are praised because they provide an estimate or guide to assist the teacher in matching student to text; readability formulas are criticized because they do not consider several factors related to success in reading. There are several readability formulas, but most use difficulty of vocabulary and average sentence length as determinants of difficulty.

Many variables in text may contribute to readability, such as format, typography, content, literary form and style, vocabulary difficulty, sentence complexity, idea or proposition density, and cohesiveness (Harris and Hodges 262). Nelson (1978) cited limitations of readability formulas as they provide no measurement of "such variables as level of abstraction, complexity of concepts, figurative and poetic language, multiple meanings, technical and scientific vocabulary" (261). Marshall (1979) noted that readability formulas do not account for the relationship between the content in the book and the knowledge of the reader, and Danielson (1987) noted that readability formulas do not consider the use of format and graphics, reader motivation, conceptual development, and outside assistance.

Regardless of their shortcomings, "readability formulas are useful guides to teachers in fitting students to the book" (Shepherd 246). Standal (1978) noted that readability formulas can be quite useful if they are regarded as general indicators, not absolutes; and Roe, Stoodt, and Burns (1987) concluded that "it has been demonstrated that estimating reading difficulty by using a formula produces much more consistent results than estimating without the aid of a formula" (388). Readability formulas provide a quick approximation of text difficulty, especially since one-to-one interaction of student to book would in most cases be inconvenient and impractical. To overcome the deficits of readability formulas, teachers must be aware of students' experiences, interests, abilities, and aspirations.

Research Design

This study sought to analyze the reading levels of students and the readability levels of textbooks at selected junior colleges in Alabama during the 1987-88 school year to answer the following research questions:

1. What is the average reading level of students in the sample?

2. What is the range of reading levels of students in the sample?

3. What percentage of students in the sample have reading levels below 13.0?

4. What is the average readability level of textbooks used in eight content area courses at five selected junior colleges in Alabama?

5. What is the range of readability levels of textbooks used in eight content area courses at five selected junior colleges in Alabama?

6. What percentage of textbooks used in eight content area courses at five selected junior colleges in Alabama have readability levels at or above 13.0?

7. What percentage of students in the sample have reading levels below the average readability level of eight content area textbooks?

Eight content area courses were selected because (1) the courses are common to core curricula for students majoring in specific fields in business, the humanities, natural sciences, and social sciences, and (2) the courses are generally viewed as survey-type courses which include regular textbook reading assignments. The courses were BIO 101 (General Biology); BUS 100 (Introduction to Business); CHM 101 (Introduction to General Chemistry); CIS 190 (Introduction to Computers); HIS 123 (World History); HIS 201 (United States History); PSY 200 (General Psychology); and SOC 200 (Introduction to Sociology).

Of the 14 public junior colleges in Alabama, five were selected to represent small, medium, and large student populations and to provide a geographical spread over the state. The state's smallest, largest, and only predominantly black junior colleges were included. Two other schools were selected to complete the geographical distribution needed to decrease overrepresentation of a particular region or type of student in the sample.

Approximately 11,600 students were enrolled at the five junior colleges during the 1986-87 school year. Using the .05 level of confidence, a sample size of 375 was needed. Because of fractions and rounding, 377 students were used. Students were randomly selected to determine their reading levels based on the percentage each of the selected junior colleges contributed to the total population.

Form E of the **Nelson-Denny Reading Test (NDRT)** was used to determine the students' reading levels. This instrument was selected because (1) "it is one of the most popular standardized reading achievement tests" (Cummins 54); (2) the test measures vocabulary and comprehension, yielding a total score; and (3) the NDRT yields grade equivalent scores that extend to 16.9.

The Fry Readability Formula and Graph were used to determine the difficulty levels of the textbooks because of five attributes: (1) the grade level range extends beyond 17.0 and will accommodate most college-level textbooks; (2) the formula measures sentence length and syllable count per 100 words; (3) the formula is fairly easy to use; (4) the formula can be utilized with computer software or manually; and (5) the formula highly correlates with other accepted readability formulas (Allen 1985; Fry 1968, 1977; Harris and Sipay 1985; Roe, Stoodt, and Burns 1987).

To calculate the readability levels of the content area textbooks, the four steps in the Fry procedure were followed. Three 100-word passages were selected from the beginning, middle, end of the book. Fitzgerald (1981) reported that three samples

were sufficient to provide accurate results with the Fry formula. The average number of sentences for the three selected passages was determined, and the average number of syllables for the three selected passages was also determined. Finally, the Fry Graph was utilized to plot the intersection of the average number of sentences with the average number of syllables (Fry 1977).

Results

The average reading level of students in the sample was 12.12; the reading levels ranged from 3.0-16.9; and 54.6% of the students in the sample read below the college level (13.0). Table 1 presents the frequency distribution of the students' reading levels, providing answers the the first three research questions.

The average readability level of the textbooks 13.93; the readability levels ranged from 9-17; and 70% of the textbooks were at the college level. (Thirty different textbooks were used for the eight content area courses previously identified.) Table 2 presents the frequency distribution of the textbook readability levels, providing answers to the fourth, fifth, and sixth research questions. Additionally, 67% of the students in the sample had reading levels below the average readability level for the textbooks. The seventh research question was answered by dividing the total number of students who scored below 13.93 (253) by the total number of students in the sample (377).

Conclusions

Because the results of this study were consistent with previously conducted readability studies, the author concluded

that students in public junior colleges in Alabama are not much different from their counterparts in other states. A wide range of reading abilities exists among students in junior colleges, more than 2/3 of the students in the sample read below the college level, and content area teachers can expect students to experience difficulties reading their textbooks unless appropriate means of instruction are employed.

Perhaps as long as open-door admissions policies exist, especially at the two-year college level, there will be students in need of assistance in developing and improving their reading skills. Several reading-in-the-content areas suggestions for teachers to use to overcome the deficits of readability formulas would be helpful as well. Content area teachers can increase their students' mastery of course material by pre-teaching vocabulary terms, developing and using chapter objectives and outlines, and establishing a purpose for reading via an introduction to or overview of the chapter. Methods like SQ3R may also be used effectively.

Content area teachers and developmental reading teachers (where they exist) must consider students' backgrounds, learning styles, and attitudes to improve the overall quality of instruction students receive in two-year colleges. If all teachers work together to lead students to improve their reading skills while grasping essential course content, students, teachers, and employers should notice a positive change in the products turned out by two-year colleges.

Table 1

Frequency Distribution of the
Students' Reading Levels

Class	Frequency	Cumulative Frequency	Percent	Cumulative Percent
16.0-16.9	40	377	10.610	100.000
15.0-15.9	38	337	10.079	89.390
14.0-14.9	46	299	12.202	79.311
13.0-13.9	47	253	12.467	67.109
12.0-12.9	39	206	10.345	54.642
11.0-11.9	36	167	9.549	44.297
10.0-10.9	41	131	10.875	34.748
9.0- 9.9	33	90	8.753	23.873
8.0- 8.9	9	57	2.387	15.120
7.0- 7.9	25	48	6.631	12.733
6.0- 6.9	6	23	1.592	6.102
5.0- 5.9	6	17	1.592	4.510
4.0- 4.9	7	11	1.857	2.918
3.0- 3.9	4	4	1.061	1.061

n = 377

$\bar{X}$ = 12.12

Table 2

Frequency Distribution of the
Textbook Readability Levels

Readability Level	Frequency	Cumulative Frequency	Percent	Cumulative Percent
17	7	30	23.333	99.998
16	1	23	3.333	76.665
15	4	22	13.333	73.332
14	4	18	13.333	59.999
13	5	14	16.667	46.666
12	6	9	20.000	29.999
11	1	3	3.333	9.999
10	1	2	3.333	6.666
9	1	1	3.333	3.333
8	0	0	0.000	0.000
7	0	0	0.000	0.000

N = 30

$\bar{X}$ = 13.93

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